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ABSTRACT

Data on the natural acquisition of sign language occurring in deaf children of deaf parents were obtained through observation of 10 deaf children (9- to 75-months-old). Short biographical sketches were compiled for each S from the parents' family history. The children tested on a cortical audiometer as severely to profoundly hearing impaired. Over a 2-year period, a data base of 80 video tapes and 4,855 utterances has been established. Four analyses of the data have been begun on such topics as the pointing actions of a 3-year-old and the use of negation by a 2- and a 3-year-old child. (GW)

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THE ACQUISITION OF SIGN LANGUAGE OF DEAF CHILDREN OF DEAF PARENTS: PROGRESS REPORT

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University of Minnesota

Research, Development, and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

June, 1974

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1. B. Egeland & A. Thibodeau. Selective Attention of Impulsive and Reflective Children. Research Report #66. June 1974.

2. R. Hoffmeister, B. Best, & D. Moores. The Acquisition of Sign Language in Deaf Children of Deaf Parents: Progress Report. Research Report #65. June 1974.

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

The Acquisition of Sign Language in Deaf Children of Deaf Parents: Progress Report

May 1974

Robert Hoffmeister, Donald Moores and Barbara Best

The process of language acquisition and use in children has been of major importance to psychologists and educators for generations. Most investigations of language acquisition have focused on the communication abilities of normal children and most analyses have taken spoken languages as their data base. Extensive theories concerning the young child's acquisition of his native language have been advanced (Brown, 1973; Bloom, 1970; Slobin, 1971). More recently attention has also been directed at communication systems which are visual-motor (Bellugi, 1972; Hall, 1959; Moores, 1971; Stokoe, 1959) and their importance to theory and educational practice is becoming more widely investigated (Lenneberg, 1967; Meadow, 1968; Moores, 1974; Quigley, 1969).

The potential for the acquisition of language is present in every child and most children acquire and use the language of their environment without apparent effort. Parents, for the most part, provide a substantial proportion of the input that enables the child to learn his language through daily interaction. Language, in turn, allows the child to receive and express information enabling him to become a full participator, interacting with the community at large.

The purpose of the present study is to investigate and analyze the natural acquisition of sign language which occurs in deaf children of deaf parents. The results and findings will be compared with studies which have focused upon normally hearing children. Measures for comparisons with these studies are currently being developed (Hoffmeister, Best and Moores, 1974). Questions regarding the developmental process of the acquisition of sign language and its similarities to and deviations from spoken language are being investigated.

The investigation proposed in this study has both theoretical and practical implications. First, interpretacion of data based on normal children learning spoken language must be generalizable to any language in order to be considered valid. Our study provides a source of data upon which current theories can be tested. Second, from an educational point of view, a major component of school programs is the use of language to transmit information. The use of sign language as a potential pedagogical tool will be a major focus of this investigation.

The language of signs is the mode of communication primarily used among the adult deaf. Most children born with a severe hearing dysfunction may eventually be assimilated into this community and an understanding of the normal acquisition process of sign language may make this assimilation easier for deaf children not born to deaf parents. The relationship of sign language to English and to the development of speech will be an important consideration in furthering an understanding of the nature of sign language.

Method

The assessment of the natural process of language acquisition among the deaf requires that one obtain circumstances similar to that of the hearing child. Since language is obtained, acquired, and expressed in a natural setting, ease of communication must be evident. Deaf children of deaf parents who communicate from birth via sign language experience the same natural circumstances that hearing children do.

At the outset of the present investigation, certain criteria as to degree of hearing loss of children, age of child, and willingness to cooperate were set. The degree of hearing loss was set at no less than 70db, ISO, 1964, in the better ear. This increased the probability that the children selected would depend on sign language as a major avenue of communication with their parents. All parents were required to be at least severely hard of hearing and had to communicate with their child either through signs alone or through signs and speech. Finally, the parents and children had to agree to a two-hour monthly visit for the duration of at least one year. Because of extremely good parental cooperation, data collection has been relatively simple.

For the past three years, visitation has continued once a month with two children in the study. It was fortunate that we were able to find two children, one at 25 months and one at 43 months, to begin the study. At the initiation of the project two other children were also identified, but one was severely hard of hearing and did not meet the

criteria for inclusion. The other was not always available for filming. These two children were discontinued from the investigation.

Since the beginning of the study, an additional eight children, ranging in age from 9 to 75 months, have been added. Currently, there are a total of 10 children involved; four boys and six girls.

The occupational breakdown of the parents of the children in the sample represents a cross section of the deaf community's occupational status at large. Presented in Table 1 is a listing of occupations of the parents utilizing a system of categorizations developed by Moores, Fisher, and Harlow (1974) in a follow up of deaf adults who had received post-secondary vocational technical training. Five of 13 working parents fall in the Professional, Technical, and Managerial Category compared to 11.67 reported in the Moores, Fisher, and Harlow study. Three parents are printers, a traditional occupation for deaf individuals, and four are employed in bench-work occupations. One parent is employed as a sheetmetal worker. There appears to be a wide range of occupations, with a tendency towards more representation in the more prestigious Professional, Technical, and Managerial Category than is found in the deaf population as a whole. See Table 1.

Subjects

All parents were asked to complete a form describing their family history. The following presents a short biographical sketch of each child which is outlined in Table 2. For the study children

have been assigned code names after well-known individuals in the area of deafness. See Table 2.

Alex, named after Alexander Graham Bell, a leading educator of the deaf and inventor of the telephone, and Helen, named after Helen Keller, are brother and sister. Both children were born deaf, Alex in 1966, and Helen in 1968. Their parents are severely hearing impaired and reside in the eastern part of the United States. At the time of filming, the mother was divorced and the only means of support in the household. Both sets of grandparents are deaf and sign language has been used throughout each generation. Their mother received her education at the New Jersey School for the Deaf (now the Katzenbach School), a residential school for the deaf, and at Gallaudet College where she received a B.S. in education. She is presently employed as a teacher in the intermediate level at the American School for the Deaf, in West Hartford, Connecticut, and is studying for a Master's degree in Educational Administration and Supervision in the California State University at Northridge. The father is presently employed as a sheetmetal worker in the eastern United States.

Alex and Helen began their schooling at two years of age. They attended the American School for the Deaf's pre-school classes in West Hartford, Connecticut on a day basis. The classes were oral at that time. The educational program now uses total communication as the method of instruction. At the time of filming, Alex was attending school at the primary level and Helen was still enrolled at the pre-school level.

Thomas, named after Thomas H. Gallaudet, founder of the American School for the Deaf (the first such school in the United States), was 43 months old at initiation of filming. He was born deaf in 1968. Thomas also has a brother who is hard of hearing. Thomas' parents both were educated in the Midwest. His mother attended oral day classes for the deaf through high school in the Minneapolis Public Schools and his father attended the Roby E. Allen School, a private oral residential school. Thomas' father obtained further training at Control Data Institute in Minneapolis and is currently employed as a designer. His mother is working as a translator at the Research Development, and Demonstration Center at the University of Minnesota. Both parents are profoundly deaf and use sign language as the main form of communication in the home.

Thomas was enrolled in Whittier School in Minneapolis, an oral pre-school program, at six months of age. At two years he was transferred to Tilden School in St. Paul, a pre-school program that uses total communication. At five years of age he is still enrolled in a total communication kindergarten. According to his teacher, Thomas is progressing well and has "good receptive language."

Alice, named after Alice Cogswell, the first deaf student of Gallaudet, was 25 months old at initiation of filming. Alice's mother, who is profoundly deaf, attended Agassiz School in Minneapolis, an oral elementary school, and completed her education at the Minnesota School for the Deaf in Faribault. The mother is divorced and the only means of support for the family at the time of filming. The father

presently is employed as a printer in California. Deafness was not present in either set of grandparents but one of Alice's aunt is hearing impaired.

At thirteen months Alice began her education at Whittier School, an oral program in Minneapolis. In an interview with one of her teachers, conducted after she had been enrolled for a year, it was stated that Alice was going "downhill" due to lack of speech in the home. At this time, Alice is participating in a class for the hearing impaired in the Minneapolis Public School System. Communication in Alice's home is conducted via signs and fingerspelling with her mother, though her mother reports she is relying more and more on oral communication.

Anne, named after Anne Sullivan, who was Helen Keller's lifelong tutor, was twenty-eight months old when filming was begun. Both her parents, who are profoundly deaf, attended the American School for the Deaf. Anne's father received further training at Gallaudet College and is working as an accountant. Her mother attended Gallaudet for two and one-half years. The mode of communication in the home is sign language. The grandparents on the mother's side are deaf and the mother also has a deaf sister. At the time of filming, Anne was the only child in the family. Anne was not enrolled in any school program at the time of filming, but is now in a pre-school class at the American School for the Deaf.

Laura, named after Laura Bridgeman, another famous deaf-blind person who rose above her handicaps, was 34 months at initiation of

filming. Her father attended the Iowa School for the Deaf, and her mother the Wisconsin School for the Deaf; both are residential schools. Laura's mother is profoundly deaf and a housewife. The father, who is hard of hearing, is currently employed as a factory worker.

Sophie, named after Sophie Fowler, one of the first instructors at Gallaudet College, was 21 months when filming began. Her mother and father are profoundly deaf. The mother attended the Indiana School for the Deaf, and her father the North Dakota School for the Deaf and Gallaudet College. Sophie's father and mother both are employed as printers in the Minneapolis area. Sophie is the second born and has a hearing impaired brother eight years old. At the time of filming she was not enrolled in an educational program. Sign language is the main communication system used in the home.

Laurent, named after Laurent Clerc, the first deaf teacher in the United States, was 17 months old at initiation of filming. He is the first born of two children in the family. Both parents are profoundly deaf and use sign language in the home. His father was educated at the New York School for the Deaf, a residential school for the deaf in White Plains. Further education was obtained at Gallaudet College and Manhattan Technical Institute in New York. Presently, he is working as a draftsman in Minneapolis. Laurent's mother attended day classes for the deaf at Birmingham High School, a public school in Santa Barbara, California, and continued her education at the National Technical Institute for the Deaf in Rochester, New York. She is presently working as an assembler in an electronics plant.

Elizabeth, named after Elizabeth Peet, a famous woman educator of the deaf, was 11 months old when filming began. Both parents are severely to profoundly deaf and use sign language as their main communication channel. Elizabeth's mother attended public day classes for the deaf in Minneapolis and completed high school at Marshall-University High in the same city; she is currently a housewife. The father attended the Minnesota School for the Deaf and works for a local manufacturing firm.

Elizabeth was enrolled in the Whittier oral public pre-school at 18 months of age. She is one of a set of twins. Her twin sister is not hearing impaired and is participating in cognitive developmental comparison studies. The father has deaf parents. Elizabeth, therefore, represents the third generation of deafness in the father's family history.

Abbe, named after Abbe de l'Epee, founder of the first institution for the deaf in France, was nine months old at the initiation of filming. Both parents are severe to profoundly deaf. His mother attended the Minnesota School for the Deaf and his father the North Dakota School for the Deaf. Abbe's mother is a housewife and his father a factory worker. Abbe is the third of four children in the family. His brothers and sister are also hearing impaired. Abbe and his siblings represent the fifth generation of deafness from both maternal and paternal sides of the family. Special attention will be given to the type and development of his signs due to the extent of deafness in his family history.

Abbe and Laurent have not been enrolled in any type of formal educational program as yet but home visits have been made by the St. Paul Public School System.

Audiometric data were obtained in a sound suite for those children who were old enough to cooperate in this type of setting. Cortical audiometry was used to measure hearing acuity of children below the age of two. Testing was done by a certified audiologist and each child was checked by an otolaryngologist prior to testing.

The results of audiometric testing, presented in Table 3, are as follows: Alex's results yielded decibel levels in the profound range to no response across both ears; Helen yielded results similar to Alex in the profound range; Thomas' results indicate that he is profoundly deaf in the left ear, and there is no response in the right ear; Alice responded in the severe to profound range, and, with the addition of a hearing aid, Alice's hearing threshold increased to the severe range at about 60db; Laura's results indicate that her loss in both ears is at the high end of the profound range of hearing acuity. Anne's audiogram indicated a hearing loss in the profound range. These six children were tested in a sound suite using normal audiometric techniques. All results were considered reliable. See Table 3.

The children tested using a cortical audiometer yielded results that fell within the severe to profound range of hearing loss. Abbe, Elizabeth, and Sophie's results were considered to be reliable.

Laurent attended two sessions. Due to mechanical complications of the machine his results are not considered to be reliable. Consequently, a sound field test was conducted and a response of 80db was received. All results given were across 500, 1000, 2000 hz. Results indicate that these children probably would not depend on their auditory systems as the only mode of communication.

Procedures

All children were video taped in their homes as they interacted with their parents or the major investigators. A Sony 3400 video portapak (VTR) 1/2 inch machine was used. The VTR presented some difficulty especially related to problems of uncontrolled lighting. Consequently, most sessions were limited to interaction in a specific locale within the home. Brown and Fraser (1963), in studying children with normal hearing, maintain that this restriction did not affect their data, and, with reference to our samples, we concur. Many settings involved the use of Fisher-Price toys such as a doll house, a school house, and a garage. These toys were chosen because of their durability and the large amount of stimulus materials contained in them. In addition to the Fisher-Price toys, various children's books that were present within the home were used. Activities that happened to coincide with the filming dates, such as Easter egg coloring or the planting of seeds which the child happened to have been engaged in at school, contributed to the elicitation of language captured on the video tape.

Each session consisted of the mother (sometimes a father) acting as playmate with the child. In many instances the investigators or their staff acted as playmates either to provide a break for the mother or because the children wanted them to become involved in the activity. When possible all children were taped once a month on a regular basis. Two 30 minute video tapes for each two hour session were obtained. The transcriptions are completed using Sony 3400 video tape machine with an RFU 55 adaptor allowing for playback on an RCA 19" portable black and white television.

Written transcriptions of each tape are being prepared by two deaf adults. The information on the video tape is transcribed exactly as signed. The one to one correspondence of an English word to a sign is used except where some signs yield more than one English word for translation. Exact tense used is written. If the meaning of the sentence is different, this difference is indicated in a separate column. The tapes are reviewed three times for exactness of transcription before the data is extracted. At this time, it takes approximately 40 man ours per half hour of tape for a reliable transcription.

Presented in Table 4 is a compilation of the amount of data collected on tapes and the age range of each of the children at the time of taping. As mentioned previously, two children have been involved in the investigation from its inception. Alice began at age 25 months, and 26 half hour tapes were collected over a period of 23 months.

Thomas, who began at age 43 months, yielded 15 half hour tapes for a total of five hours. During the second year five other children were identified in the Minnesota area and incorporated into the study. Laura, 34 months, yielded four tapes and Sophie, age 21 months, yielded five. The youngest children in the group are Laurent, Abbe, and Elizabeth who at seventeen, zero, and eleven months respectively, provided a total of five hours of tape. Therefore, at the present time we have a total of 80 tapes yielding 40 hours of data. See Table 4.

Presented in Table 5 are (a) the average utterances per child per hour of tape and (b) the total utterances obtained from each child. The average utterance per hour of these children favorably compares with many of the studies of normal hearing children mentioned by Brown (1973). A total of 4855 utterances across 66 months is available for data analysis. Preliminary analysis is in progress and is described in the following section. See Table 5.

Progress

In the developmental phase this investigation has focused its attention on data collection. Preliminary analysis of the initial video tapes of the two children who began the project has yielded one research report (Hoffmeister & Moores, 1973) and three working papers. The research report is concerned with the pointing action of a two-year deaf child and concludes that pointing used as a specific reference is one of the first major constructions signaling

the two-sign stage of acquisition. It was hypothesized that this particular use of pointing may act as a type of functor for the child to single out a specific object, and the co-occurring sign is a comment or a label referring to that object. This compares to the use of pointing that occurs with this/that and here in normal hearing children described by Bloom (1970), and Brown (1973).

Four working papers are in progress, each concerning a specific linguistic construction in the development of sign language in deaf children of deaf parents. Working paper #1, (Hoffmeister & Moores, 1973) deals with the pointing actions of a three-year=old deaf child. The use of the pointing actions of the older deaf child appears to be an activity that eventually moves from the use of pointing, as a sign, to a more formal sign that has an English gloss of that. It was hypothesized that specific reference evolves into a formalized signed morpheme interpreted as that, while pointing which indicates location does not evolve into a separate sign. The locative determined by pointing may eventually decrease in frequency as the lexicon of the child increases. The second working paper (Toothman, Hoffmeister, & Moores, 1973) analyzes the use of negation by a two- and a three-year=old deaf child. It was concluded that these two children indicated a more mature and better developed use of the negative as age increased. In a comparison with normal hearing children the development of negation in these deaf children appeared to occur in a sequence opposite to that found by Bloom (1970). The third working paper

(Hoffmeister, Best, & Moores, 1974) deals with establishing the translation rules which would allow the computation of a mean length of utterance (MLU) and statistical data needed for comparisons with other developmental studies. Outlined in this paper are definitional rules and translation rules needed for interpretation that will allow linguistic analysis. Linguistic derivations from Stokoe's (1960) and Stokoe, Cronberg, and Casterline's (1965) descriptions of the elements that define the phonological and morphemic components in sign language were expanded upon. MLU, range, and upper bound have been computed on eight of the ten children in the project. A tentative conclusion is that MLU development lags behind normal hearing children until 42 months, but an increase in MLU similar in slope to normal hearing children occurs.

In addition to the above mentioned working papers, analysis has begun on the use of the locative, question formation, and further development of the use of pointing in the later months of the two children previously discussed. Further data is being analyzed for comparison with the remaining eight children.

In summary, ten children have been identified. Over a two-year period of data collection, 80 video tapes have yielded 4855 utterances allowing for preliminary analysis to begin. One research report and three working papers are completed, two working papers dealing with the locative and use of questions are in process.

Data collection will end in the summer of 1974 whereby extensive analysis of the data will begin.

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Table 1

Occupational Status of Employed Parents

Occupational Category	Mother	Father
Professional, Technical, and Managerial (5)		
Teacher	1	
Accountant		1
Draftsman, (Designer)		2
Translator/Research Assistant	1	
Machine Trades (4)		
Printer	1	2
Bench-work Occupations (4)		
Factory Worker		3
Assembly-Electronics	1	
Structural Work Occupations (1)		
Sheetmetal Worker		1
Five parents list their occupations as homemakers.	5	

Table 2

Biographical Outline of Subject and Parent's Family History

Subject	Date of Birth	Ordinal Status	No. of Siblings	Generation of Deafness	School Placement	Age of Entrance
1. Alex	5/28/66	1	1	4	Res. School	2 years
2. Kalen	4/1/68	2	1	4	Res. School	2 years
3. Thomas	6/8/68	1	1	2	Day Classes	6 months
4. Alice	11/9/69	1	0	2	Day Classes	2 years
5. Anne	8/10/70	1	0	3	Res. Preschool	2 years
6. Laura	9/25/70	1	1	2	Day Preschool	3 years
7. Sophie	6/28/71	2	1	2	None	———
8. Laurent	6/8/72	1	0	2	Home Visits	———
9. Elizabeth	6/20/72	1**	1	3	Day Preschool	18 months
10. Abbe	7/12/72	3	2	5	Home Visits	———

*Explanation of Letters

A. Less than four years at Gallaudet
B. Gallaudet Graduate
C. NTID or Technical Institute

**Twin

Table 2

Biographical Outline of Subject and Parent's Family History

th	Ordinal Status	No. of Siblings	Generation of Deafness	School Placement	Age of Entrance	Mother's Education and Occupation	Father's Education and Occupation
5	1	1	4	Res. School	2 years	B.A. (B*) Teacher	Sheet Metal Worker
	2	1	4	Res. School	2 years		
	1	1	2	Day Classes	6 months	H.S. Translator	H.S. + C* Designer
9	1	0	2	Day Classes	2 years	H.S. Homemaker	Printer
0	1	0	3	Res. Preschool	2 years	H.S. + A* Homemaker	B.A. (B*) Accountant
0	1	1	2	Day Preschool	3 years	H.S. Homemaker	H.S. Factory Work
1	2	1	2	None	———	H.S. Printer	H.S. + A* Printer
	1	0	2	Home Visits	———	H.S, + C* Assembler	H.S. + A,C* Draftsman
2	1**	1	3	Day Preschool	18 months	H.S. Homemaker	H.S. Factory Work
2	3	2	5	Home Visits	———	H.S. Homemaker	H.S. Factory Work

**Twin

ears at Gallaudet
te
l Institute

Table 3

Unaided Audiograms of Children and Dates of Tests

Puretone Audiometric Results:

		Ear	500	1000	2000	Date of Testing
1.	Alex	Right	95	NR	NR	9/30/73
		Left	100	110	NR	
2.	Helen	Right	90	100	NR	1/28/74
		Left	100	NR	NR	
3.	Thomas	Right	NR	NR	NR	7/12/72
		Left	105	105	NR	
4.	Alice	Right	85	90	85	7/10/72
		Left	90	95	85	
5.	Anne	Right	95	105	NR	2/14/74
		Left	95	105	NR	
6.	Laura	Right	110	NR	NR	5/9/73
		Left	100	95	105	

Cortical Audiometric and/or Sound Field Results:

7.	Sophie	severe -to- profound bilateral loss	10/31/73
8.	Laurent	cortical - couldn't test 80 db - sound field response	8/3/73
9.	Elizabeth	100 db at 500 hz severe to profound bilateral loss	10/24/73
10.	Abbe	severe bilateral sensori-neural loss	10/10/72

All results in db rating ISO, 1964.

Table 4

Data Collection Information: Ages at Initiation and End of Filming, Number of Tapes, and Number of Hours for Each Subject

Subject	Age at Start of Taping	Age at End of Taping	No. of Months of Taping	No. of Tapes Collected	Hours of Taping
1. Alex	75 mos.	84 mos.	9 mos.	5	2.5
2. Helen	52 mos.	62 mos.	10 mos.	5	2.5
3. Thomas	43 mos.	64 mos.	21 mos.	15	7.5
4. Alice	25 mos.	48 mos.	23 mos.	26	13.0
5. Anne	28 mos.	32 mos.	5 mos.	10	5.0
6. Laura	34 mos.	38 mos.	4 mos.	4	2.0
7. Sophie	21 mos.	28 mos.	7 mos.	5	2.5
8. Laurent	17 mos.	- - - -	1 mo.	1	.5
9. Elizabeth	11 mos.	17 mos.	6 mos.	5	2.5
10. Abbe	9 mos.	17 mos.	8 mos.	4	2.0

Total Number of Tapes: 80

Total Number of Hours: 40

Table 5

Average Number of Utterances Per Hour of Taping and Total Number of Utterances for Each Subject*

	$\bar{X}$ Utterance/Hour	Total Utterances
Alex	116	349
Helen	198	596
Thomas	181	1087
Alice	207	1865
Anne	172	687
Laura	135	271
	TOTAL:	4855

*The remaining four subjects were filmed in the recent past therefore not allowing enough time for relaible transcriptions to be completed.

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